

REVISION OF THE GENUS *HERVIELLA*
(OPISTHOBRANCHIA: EOLIDACEA)

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ABSTRACT

HervIELla Baba (1949) (Opisthobranchia: Eolidacea) is especially characterized by a single row of cerata in the right liver, a penial stylet and a 'serial' spermatheca. *MuessA* Marcus (1965), with the same characteristics, is a synonym. Eight species are known from the western Pacific Ocean including the new species *H. burchi* described in this paper. Two subgenera are distinguished; *HervIELla* s. s., with the central radular cusp longer than the lateral denticles, contains the species *H. yatsui* (Baba) type species, *H. affinis* Baba, *H. burchi* sp. nov., *H. evelinae* (Marcus), *H. claror* Burn and *H. exigua* (Risbec); *MarcIELla* subgen. nov., with the lateral denticles nearly or as long as the central cusp, contains the species *H. mietta* Marcus (type species) and *H. albida* Baba.

Noumeaella Risbec (1937) with similar genital characters and an arch of cerata in the right liver appears to be closely related to *HervIELla*. The 2 genera form a distinct group within the family Favorinidae, and with some reservations are placed together in a new subfamily, *HervIELlinae*.

Cleioproct eolids with a single row of cerata in the anterior or right liver are few in number and their known distribution is restricted to the western Pacific Ocean. Eight species appear to be united by this taxonomically important anatomical characteristic. The current revision of both the generic and specific units involved is derived from the literature, examination of preserved specimens of *H. burchi* and *H. mietta*, together with field notes on living specimens of these 2 species, and a study of living specimens of *H. claror*.

The writer is indebted to Dr. J. B. Burch, Museum of Zoology, University of Michigan, Ann Arbor, Michigan, U. S. A., for the opportunity to examine some of the *HervIELla* material described by Dr. Ernst Marcus and himself (1965), as well as to study his field notes made at the time of collection. This research was undertaken while the writer was a recipient of a grant from the Science and Industry Endowment Fund,

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THE GENUS *HERVIELLA*

The primary generic unit involved in this revision is *HervIELla* Baba (1949: 107, 180), the type of which, *H. yatsui* (Baba, 1930), is now known anatomically (Baba, 1966b). Based upon the type species, it appears that the following characteristics are diagnostic for the genus: a single row of cerata in the right liver; anterior of foot expanded and rounded; rhinophores simple; jaws high anteriorly and narrow posteriorly, masticatory edge with a single row of denticles; penial stylet present; and female ducts with the spermatheca 'serial' (i.e., it is formed by a swelling of the oviduct or vagina).

The recently constituted genus *MuessA* Marcus (1965: 282), type *M. evelinae* Marcus (1965: 283) described from a single very small preserved specimen,

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is similar to *Herviella*, except that the rhinophores and tentacles are annulate in the preserved Holotype, and the jaws are stated to be oblong in shape. Annulate rhinophores and tentacles occur in a preserved specimen of *H. mietta* examined for this revision, but field notes and published descriptions indicate that these appendages are smooth in life. Therefore, it is presumed that living *Muessa* have smooth rhinophores and tentacles. The oblong shape of the jaws depends upon how they are orientated for observation. In *Muessa* (Marcus, 1965: fig. 38) the jaws are shown with the masticatory border in the horizontal position. If the figure is turned so that the upper anterior margin of the jaw is in the vertical position, then when compared with the figure of the jaw of *H. yatsui* (Baba, 1966: pl. 1, fig. 4), it can be seen that the differences are not objective. Consequently, I regard *Muessa* to be identical with and a junior synonym of *Herviella*.

As a result of this synonymy, there are 7 species that definitely can be assigned to the genus *Herviella*. An eighth species, *Aeolidia exigua* Risbec (1928: 245), in which the position of the anus is not known, is tentatively ascribed to *Herviella* (Burn, 1963: 18; Marcus & Burch, 1965: 251). These 8 species are sharply divided in the shape of the radular teeth. In *H. yatsui*, *H. affinis*, *H. burchi*, *H. evelinae*, *H. claror* and *H. exigua* the median cusp is longer than the 3 to 5 denticles on each side. *Herviella mietta* and *H. albida* have the outermost of the 4 to 9 denticles on each side nearly or as long as the median cusp and with the intermediary denticles shorter. These 2 species can be separated by this characteristic into a subgenus *Marciella* subgen. nov., with *H. mietta* Marcus (1965) designated as the type species.

The jaw of *Herviella burchi* is inter-

mediate in shape between those of *H. yatsui*, *H. evelinae* and *H. claror*, and therefore it does not seem justified to distinguish the latter 2 species even subgenerically on jaw shapes.

Marcus & Burch's *Herviella claror* (1965: 251) differs from *H. claror* Burn (1963: 18) in colour pattern and the shape of the jaw and radular teeth. Here it is described as *H. burchi* sp. nov.

The following characterizations of the species of *Herviella* are drawn from the literature unless otherwise stated. By means of line drawings, Fig. 1 shows specific differences as they occur in the colour pattern of the anterior portion of the body and the cerata (columns 1 & 2), the jaws and masticatory border (column 3), and the radular teeth (column 4).

Subgenus *Herviella* s.s. Type species: *H. yatsui* (Baba, 1930).

The lateral denticles of the radular teeth are shorter than the central cusp and they generally decrease in height toward the lateral margins.

H. yatsui (Baba, 1930: 121; 1937: 328; 1949: 107, 180; 1966b: 1; Abe, 1964: 70). Japan; Pacific and Japan Sea coasts, common. Body yellowish white; black U-shaped pigmentation pattern on the head continuing on to the tentacles; black specks occur on the median part of the back; rhinophores with a black band at their mid-length; cerata with an upper and lower cluster or ring of black spots and an opaque white band at the tip. Jaws high anteriorly, tapering sharply behind, concave dorsally, with 15-20 denticles. Radula with 18-25 teeth; central cusp short; 4-5 denticles on each side. Penial stylet with 3-6 spines along the concave side; spermatheca spherical.

Like *Herviella mietta* and *H. albida*, the denticles of the masticatory borders are conical. The spines on the penial stylet of *H. yatsui* are unique

FIG. 1. Specific differences of the species of *Herviella*. Colours are indicated as follows: fine stippling, opaque white; heavy stippling, black; oblique hatching, red, orange or yellow.

	Color pattern of anterior body	Color pattern and shape of cerrata	Jaw shape (a) and masticatory border (b)	Radular teeth
H. yatsui after Baba 1966b				
H. affinis after Baba 1966b				
H. burchi after Marcus and Burch 1965 (ceras drawn from field notes)				
H. evelinae after Marcus 1965 (Anterior body reconstructed)		?		
H. claror after Burn 1963				
H. exigua after Risbec 1928			?	
H. mietta after Marcus and Burch 1965 (Jaw drawn from own observations)				
H. albida after Baba 1966a				

among the Eolidacea.

H. affinis Baba (1960: 303; 1966b: 4; Abe, 1964: 71). Japan; Pacific and Japan Sea coasts, not common. Body yellowish-white, without U-shaped pigmentation pattern on the head, but instead with black specks covering the head, back, sides and lower half of the cerata; rhinophores with a black band at their mid-length; cerata with an orange ring below their tips. Jaws high anteriorly, tapering behind, dorsally concave; with 10-12 large oblique denticles. Radula with 13-14 teeth, central cusp long and wide, 3-4 denticles on each side. Penial stylet long and curved.

Oblique or raking denticles occur also in *Herviella burchi*, *H. evelinae* and *H. claror*. All 4 species have black speckling on the body and 3-4 denticles on each side of the wide central cusp of the radula. Shape of the jaw and colour patterning, particularly on the cerata, separate these 4 species.

H. burchi sp. nov. (*H. claror* Marcus & Burch, 1965: 251, fig. 28-30; non *H. claror* Burn, 1963: 18). Marshall Islands; Eniwetok Island, three specimens. Body white, without U-shaped pigment pattern on the head, with black specks and white spots on the back and side of the body (clear transverse areas occur between the cerata groups on opposite sides of the body); the lower part of the rhinophores and tentacles speckled with black pigment; cerata with an orange ring at the distal one-third and an opaque white band above and below this. Jaws high anteriorly, tapering slightly behind, slightly convex dorsally; with 6 large inclined denticles. Radula with 11 teeth, central cusp broad and blunt, 3-4 lateral denticles on each side. Penial organ not known.

The Holotype is a preserved specimen 4.5 mm long in the collections of the Museum of Zoology, University of Michigan, (cat. no. 230634). A total of 3 specimens were collected by Dr.

William H. Heard, April 2-12, 1960. Only the Holotype was available for study, the other 2 specimens having been preserved for cytological studies.

The new species differs from *Herviella claror* Burn (and other species of the genus) in colour pattern, jaw shape and the blunt central radular tooth. The ovoid shape of the jaws is especially distinctive. The species is named for Dr. J. B. Burch, who allowed me to examine the type specimen and his field notes, sketches and photographs made at Eniwetok Atoll.

H. evelinae (Marcus, 1965: 283). Caroline Islands; Ifaluk Island, one specimen. Body yellowish (?) in life, with black specks on the back, head, tentacles and rhinophores. The jaws narrowed behind, with 8 large oblique denticles having rough edges. Radula with 14 teeth, central cusp broad with curved sides and 3-4 lateral denticles on each side. Penis with a long stylet; the spermatheca exists only as a small dilation.

The broad radular teeth, rough-edged masticatory denticles and the posteriorly narrowed jaws (referred to as 'oblong' by Marcus, 1965: 282) are the diagnostic characteristics of *H. evelinae*.

H. claror Burn (1963: 18). Australia; northern New South Wales (Woody Head), 2 specimens. Body white with black speckles on the back, head, tentacles and rhinophores; cerata with an orange band below the tip and black speckling on the anterior side. Jaws slightly narrowed behind; with 6 large oblique denticles having smooth edges. Radula with 13 teeth, central cusp long with straight sides and having 3 denticles on each side. Penis with a curved stylet.

Herviella claror and *H. evelinae* have similarly shaped jaws, but those of *H. claror* are broader posteriorly and the masticatory denticles have smooth edges. The long taper of the central radular tooth is unlike that of

any other *Hervietta*. An orange band on the cerata occurs also in *H. affinis*, and *H. burchi*, and a red one occurs on the cerata of *H. exigua*.

H. exigua (Risbec, 1928: 245; 1953: 134).

New Caledonia; Kouaoua Bay, 3 specimens. Body yellowish with minute black speckles grouped together to form greyish areas, tentacles and rhinophores with a black band in their middle portion, cerata with a red band below their tips. Jaws with a single row of strong denticles. Radula with about 12 teeth, the central cusp long and tapering and having 3 denticles of equal length on each side. The penial stylet is long and curved.

The position of the anus is not known for *Hervietta exigua*, therefore its placement in the genus *Hervietta* is somewhat doubtful. The red band on the cerata and even height of the lateral denticles are the distinctive characteristics for the species.

Subgenus *Marciella* subgen. nov. Type species: *H. mietta* Marcus & Burch (1965).

The marginal lateral denticles of the radular teeth are nearly or as long as the central cusp; intermediary lateral denticles are shorter than the marginal denticles.

The subgenus is named for Dr. Ernst Marcus of Brazil who has added immensely to the knowledge of the Eolidacea and other Opisthobranchia.

H. mietta Marcus & Burch (1965: 251).

Marshall Islands; Eniwetok Island, not uncommon. Body white below, black above, the pigmentation extending on to the cerata (except at the tips), head, tentacles (dorso-median line) and rhinophores (middle third black, with a short pigmentation line below). Jaws high anteriorly, narrow behind and deeply concave dorsally; with at least 30 sharp denticles, the largest below (personal observation). Radula with 18 teeth, the central cusp short and pointed, with 8-9 thin denticles on each side, the outermost denticle as long as the central cusp. Penial

stylet curved.

The jaws figured for *H. mietta* in Fig. 1 are from the Holotype (University of Michigan, Museum of Zoology, cat. no. 230630); they measured 0.9 mm in both length and height. The Holotype is a specimen with heavy black pigment which, in the original description, is called the second colour type. The first colour type (University of Michigan, Museum of Zoology, cat. no. 230631) has morphologically defective jaws by being deeply incised (Marcus & Burch, 1965: fig. 34; confirmed by personal observation). Radular and other characteristics are in accord despite the fact that this first colour type has a light and transparent body, white granules and sometimes black pigment on the back, the head with a black pattern, the rhinophores with a black band and the cerata clear with yellow digestive glands.

This is the most distinctive species of the genus. The important diagnostic characters are carrot-shaped cerata that are predominantly black in colour, black pigment on the body, and 8-9 denticles on each side of the small central cusp. The jaws are unlike those of any other *Hervietta* (see Fig. 1, column 3); the anterior margin is more erect and evenly convex, the masticatory border is deeper and bears more (about 30) denticles, the dorsal margin is deeply concave, and the posterior end is narrow and squarely truncate. Both *H. mietta* and *H. albida* have a somewhat similar pattern of black pigment on the head, otherwise they are quite different.

It is doubtful that the next species, *Hervietta albida*, should be classified in the subgenus *Marciella* with *H. mietta*. Except for the long marginal denticles of the radular teeth, *H. albida* belongs to the subgenus *Hervietta* s.s., as indicated by the fusiform cerata, the configuration of the anterior edge of the jaws and the long 'legs' of the radular tooth. Raising *Marciella* to a

full genus may be justified when more knowledge is available, particularly concerning the reproductive organs. For the present, however, it is maintained as a subgenus, solely to include the 2 species with long marginal denticles.

H. albida Baba (1966a: 361). Japan; Inland Sea (Seto, Kii), one specimen. Body yellowish-white with scattered white spots on the head and back, black pigment present in a U-shape pattern on the head, a pigment line on the tentacles, a pigment band on the rhinophores and in lines laterally between the groups of cerata; cerata with 2 bands of opaque white in their upper halves. Jaws high anteriorly, narrow behind, deeply concave dorsally; with 16-18 pointed denticles. Radula with 20 teeth, the central cusp with a long taper, and with 3-4 denticles on each side and nearly as long as the central cusp. The penial stylet is short and curved.

The other 2 Japanese species, *Herviella yatsui* and *H. affinis*, closely resemble *H. albida* in body shape, general body coloration and shape of the jaws. *Herviella albida* is separated from these 2 species by the long marginal lateral denticles of the radular teeth. Fewer lateral denticles (3-4) and much less black pigment distinguish *H. albida* from *H. mietta*.

DISCUSSION

Herviella shows an unusual character in the structure of the female reproductive ducts. The spermatheca is a dilation of the vagina with 2 separate openings, one to the vagina proper and the other to the oviduct and gland mass. Thus it may be termed 'serial' following the terminology of similar parts in the doridacean opisthobranchs. In the species of the Eolidacea, the spermatheca is a blind sac with a narrower stalk attached at the inner end of the vagina (Cleioprocta) or nearer the outer end (Acleioprocta), or it

may have a separate external opening near that of the vagina (some, but not all, Pleuroprocta).

From the literature, there appears to be only 2 cleioproct species comparable to *Herviella*: *Palisa papillata* Edmunds (1964: 12, fig. 10A; = *Moridilla kristenseni* Marcus & Marcus, 1963: 44) and *Noumeaella rehderi* Marcus (1965: 282, fig. 35). In *P. papillata* the spermatheca is a dilated section of the vagina; in *N. rehderi* it is lobated. A similar 'serial' spermatheca is reported in a number of species of the dendronotacean genus *Doto* (Marcus, 1957; 1961: 36-41, figs. 129, 134, 138, 140, 146; Marcus, E. & E., 1960: 166, fig. 57), which, like *Herviella*, grow to little more than 10 mm in length and have very slender bodies. Therefore, it would seem that smallness of size may have led to this parallel development within related groups.

Palisa has 5 or 6 rows of cerata in the right liver and, therefore, in the present eolid classification, belongs to the family Facelinidae. Like *Noumeaella*, *Palisa* has rhinophores that are thickly papillate on their rear edges, but unlike *Noumeaella*, the penis is unarmed.

The present classification places both *Herviella* and *Noumeaella* among the genera of the family Favorinidae (characterized by the right liver in an arch or single row), subfamily Favorininae (characterized by cerata in a single series). In *Noumeaella* the right liver forms an arch, the rhinophores are papillate as mentioned above and the foot corners are tentaculiform. The similarity of the genital organs, both with penial stylet and serial spermatheca, suggest that these 2 favorinids should be grouped together, perhaps even so far as to warrant a subfamily of their own, *Herviellinae*.

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RESUMEN

REVISION DEL GENERO *HERVIELLA* (OPISTOBRANCHIA: EOLIDACEA)

R. Burn

Herviella Baba 1949 (Opisthobranchia: Eolidacea) se caracteriza especialmente por una hilera de "cerata" en el hígado derecho, un estilote penial y una espermateca "serial". *Muessia* Marcus 1965, con las mismas características es un sinónimo. Ocho especies son conocidas del Pacífico occidental, incluyendo la nueva *H. burchi* aquí descripta. Se distinguen dos subgéneros: *Herviella* s.s. con la cúspide del diente raquídeo más larga que los dentículos laterales, contiene las especies *H. yatsui* (Baba) tipo, *H. affinis* Baba, *H. burchi* sp. n., *H. evelinae* (Marcus), *H. claror* Burn y *H. exigua* (Risbec); *Marciella* subgénero nuevo, con los dentículos laterales casi tan largos como la cúspide central, contiene la especie *H. mietta* Marcus (tipo), y *H. albida* Baba.

Noumaeaelia Risbec 1937 con características genitales similares y un arco de "cerata" en el hígado derecho, parece estar muy relacionada a *Herviella*. Los dos géneros forman un grupo distinto dentro de la familia Favorinidae, y con algunas reservas se juntan en una nueva subfamilia, *Herviellinae*.

АБСТРАКТ

РЕВИЗИЯ РОДА *HERVIELLA*
(OPISTHOBRANCHIA: EOLIDACEA)

Р. БЁРН

Род *Hervietta* Baba (1949) (Opisthobranchia: Eolidacea) характеризуется следующими особенностями: один ряд папилл (*cerata*) в правой печени, пениальный стилет и "серийная" сперматека (семеприемник). Род *Muessia* (Marcus, 1965), имеющий те же признаки, является синонимом.

Из западной части Тихого океана известно 8 видов рода *Hervietta*, включая новый вид *H. burchi*, описанный в настоящей работе. Различаются 2 подрода: *Hervietta* s.s., у которого центральный зубец радулярной пластинки длиннее латеральных зубчиков. Сюда относятся - *H. yatsui* (Baba) тип; *H. affinis* Baba, *H. burchi* sp. nov., *H. evelinae* (Marcus), *H. claror* Burn, *H. exigua* (Risbec); *Marciella* subgen. nov., с латеральными зубчиками почти или такой же длины, как и центральный зубец; он включает 2 вида: *H. mietta* Marcus (типовой вид) и *H. albida* Baba.

Noumeaella Risbec (1937) со сходным строением гениталий и с дугообразным расположением папилл в правой печени, видимо представляет собой род, близко-родственный *Hervietta*. Эти 2 рода образуют хорошо-очерченную группу внутри семейства *Favorinidae* и, с некоторыми оговорками, выделены в новое подсемейство *Herviellinae*.